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ABSTRACT

In February 1990, the President of the United States and the 50 state governors proclaimed a set of six national goals to prompt profound improvements in schools and student achievement by the year 2000. These six goals reflect widely held concerns that most people have not been receiving the kind of education they need to meet the challenges of twenty-first century life. This digest addresses one of the six national goals: "By the year 2000, American students will leave grades 4, 8, and 12 having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so that they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy." (Author/DB)

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Student Achievement in Core Subjects of the School Curriculum

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In February 1990, the President and state governors proclaimed a set of six national education goals to prompt profound improvements in schools and student achievement by the year 2000. These six goals reflect widely held concerns that most Americans have not been receiving the kind of education they need to meet the challenges of twenty-first century life. This Digest addresses one of the six national goals: "By the year 2000, American students will leave grades four, eight, and twelve having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so that they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy."

Deficiencies in Student Achievement. During the 1970s and 1980s, the National Assessment of Educational Progress (NAEP) issued several reports revealing that a majority of students are NOT developing intellectual capacities necessary for democratic citizenship, lifelong learning, and productive employment in the economic system (Mullis, Owen, and Phillips 1990).

Most students seem to develop basic skills, which involve low-level cognition. However, few students, only five to eight percent of our 17-year-olds, demonstrate ability to solve multiple-step problems, synthesize data, read analytically, and think critically. Furthermore, performance on tasks requiring high-level cognition has declined since the early 1970s.

Most 17-year-olds have revealed serious gaps in their knowledge of core academic subjects. For example, in a summary of findings from twenty years of NAEP, Mullis, Owen, and Phillips (1990, 9) report that "only small proportions of students appear to develop specialized knowledge needed to address science-based problems, and the pattern of falling behind begins in elementary school." A similar pattern of deficiency in knowledge achievement is revealed by the NAEP studies of mathematics, history, literature, geography, and civics. Less than 10 percent of 17-year-old students seem to have developed both an understanding of key ideas in these core subjects and the ability to apply these ideas to completion of tasks that require high-level cognition (Mullis, Owen, and Phillips 1990, 29). An especially disturbing finding is that high school students did "significantly less well" in civics in the 1988 assessment than their 1982 counterparts (NAEP 1990, 13). Large numbers of students appear to lack knowledge and skills usually associated with responsible citizenship in a constitutional democracy.

The United States ranks near the bottom among economically developed countries on international assessments of students' knowledge of mathematics and science. The gap in achievement between American students and their counterparts in other countries increases as students move through the grades in school. Fifth-grade students in the United States score near the median among their counterparts in the international assessments; eighth-grade students fall markedly below the median; and twelfth-grade students rank near the bottom in comparison to students from the other countries (Darling-Hammond 1990, 287-288).

American respondents also ranked near the bottom in a recent international assessment of geographical knowledge (Salter 1990, 8). These results are consistent with various other reports of geographic illiteracy among large numbers of American students (Stoltman 1990, 39-46).

If by the year 2000 American students are to leave school "having demonstrated competency in challenging subject matter"—the core subjects of the school curriculum—then large improvements in teaching and learning must be accomplished. The current levels of student achievement fall far short of the standard implied by the national education goal.

Factors Associated with Higher Levels of Student Achievement. The various NAEP surveys of achievement in the 1980s included information on background variables related to education. These data can be related to student performances on the NAEP instruments to reveal factors that are associated with higher levels of student achievement. For example, better performances in the NAEP surveys of achievement have been associated with the following factors: high educational attainment of parents, a home environment where reading and discussions of ideas are valued, limited television viewing, significant amounts of time spent on homework assignments, and a stable family structure.

The NAEP reports also suggest relationships between systematic, substantial, and stimulating exposure to core subjects and higher scores on tests of achievement in these academic disciplines. Students who reported more opportunities to study key topics and ideas in core subjects made higher scores on the NAEP tests of achievement. Further, students who reported an early start in studying core subjects, through substantial exposure to these content areas in elementary school, tended to perform better in the NAEP surveys.

Another factor associated with higher achievement was active learning. Students who said that their teachers required them to interpret and apply knowledge to the completion of tasks tended to score much higher on these assessments than did respondents who reported that their lessons were limited mostly to passive reception of knowledge through lectures and textbooks. For example, students in civics classes who reported participation in mock trials or simulated congressional hearings tended to perform at a higher level on the assessment of knowledge in civics than did students who were not involved in these kinds of active learning experiences (NAEP 1990, 83-85).

A final factor associated with higher achievement levels in the NAEP surveys was use of electronic technology in teaching and

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learning the core subjects. For example, students with access to computers for problem solving tended to achieve a higher proficiency in mathematics than those who did not use computers.

How To Improve Student Achievement in Core Subjects. Several widely accepted ideas about what can be done to improve student achievement are presented in the following short list. These ideas are prominent examples, among many others, in the growing literature on reform and restructuring of education in schools.

- Increase the quantity and quality of challenging subject matter that all students are required to study in elementary and secondary schools, and encourage more students to pursue advanced coursework in the core subjects (e.g., English, mathematics, science, history, geography, and civics).
- Increase the amount of time in which all students, at all levels of schooling, are systematically engaged in studying and learning the core subjects.
- Provide regular opportunities for in-depth investigations of key topics and problems as an alternative to typical superficial surveys of subject matter.
- Emphasize active learning, thinking and doing in response to challenging assignments, in contrast to passive reception of knowledge transmitted via lectures and textbooks.
- Develop cognitive skills and processes, such as writing, by frequent and systematic practice that involves teaching and learning of underlying processes, such as the dynamics of written composition.
- Use multiple resources and media for teaching and learning—such as electronic technology, primary documents, classic works of literature, and science laboratories—instead of relying upon textbooks as the primary or exclusive tool of instruction.
- Establish high expectations for student performance based on the assumption that virtually all students can learn at high levels.
- Create a school climate that is conducive to student achievement through the exercise of strong instructional leadership and maintenance of a safe, stable educational environment.
- Involve parents in the process of education as monitors of homework assignments, encouragers of academic achievement, and reinforcers of school rules.
- Develop instruments for assessing student achievement that require performance of high-level cognitive skills and processes—the application of knowledge to complex problems and issues—instead of testing that emphasizes recall of discrete information.

The Consequences of Improved Student Achievement. Attainment of the national educational goal on student achievement and intellectual development is associated with the intertwined consequences of preparation of students for (1) responsible citizenship in their constitutional democracy, (2) lifelong learning, and (3) productive employment in the complex and global economy of the twenty-first century.

More than 200 years ago, the Founders of the United States recognized the relationship of education to responsible citizenship in a free government based upon popular sovereignty. This critical connection between liberty and learning will be even more important in the future, because the complexities of civic affairs and public issues in the twenty-first century will greatly exceed those of earlier eras.

Preparation for a complex and dynamic future will require citizens with the will and the capacity to learn new ideas and techniques to cope with unforeseen problems. Those who have developed high-order cognitive capacities in their youth will be most equipped to facilely and fruitfully pursue more education to meet novel challenges.

Finally, enjoyment of democratic citizenship has always been linked to economic well being. Unlike the past, however, most jobs in the worldwide economy of the future will require high-level cognitive capacities to operate "high-tech" equipment in the acquisition, organization, and application of information for the solution of complex problems. Therefore, if we Americans would be successful in the global economic competition of the next century, we must greatly improve the quality of education in our schools.

The United States cannot maintain its constitutional democracy or its economic well being unless all students greatly improve their levels of achievement in the core subjects and development of intellectual capacities. "The current levels of student achievement are unacceptably low for our country's needs and aspirations and for the personal goals of its citizens" (Mullis, Owen, and Phillips 1990, 29). Therefore, much effective effort must be undertaken immediately and persistently to substantially improve the teaching and learning of core subjects in the school curriculum, because we are "a nation at risk."

References and ERIC Resources

The following list of resources includes references used to prepare this Digest. The items followed by an ED number are in the ERIC system. They are available in microfiche and paper copies from the ERIC Document Reproduction Service (EDRS). For information about prices, contact EDRS, 7420 Fullerton Road, Suite 110, Springfield, Virginia 22153-2852; telephone numbers are (703) 440-1400 and (800) 443-3742. Entries followed by an EJ number are annotated monthly in CURRENT INDEX TO JOURNALS IN EDUCATION (CIJE), which is available in most libraries. EJ documents are not available through EDRS. However, they can be located in the journal section of most libraries by using the bibliographic information provided below.

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